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(71) Applicant(s)

Julian S. Shen

No.22, Alley 432, Kao-Feng Road, Hsinchu Taiwan,  
Taiwan

(72) Inventor(s)

Julian S. Shen

(74) Agent and/or Address for Service

J A Kemp &amp; Co.

14 South Square, Gray's Inn, LONDON, WC1R 5LX,  
United Kingdom(51) INT CL<sup>7</sup>

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(52) UK CL (Edition S )

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(56) Documents Cited

GB 2327880 A GB 2105987 A GB 1439865 A

EP 0572199 A US 5809699 A US 3960216 A

WPI Accession No: 1999-181570 &amp; CN 001200303

WPI Accession No: 1997-419601 &amp; JP 090187524 A

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(54) Abstract Title

**Fire curtain system**

(57) The curtain 4 is housed in a protection case 3 when inoperative and descends to floor level under fire and/or smoke conditions. Typically the curtain 4 is associated with a hose device 41 which fills with water and aids the descent of and cools the curtain. Sprinklers 21 in the casing protect the curtain and help to extinguish any fire.

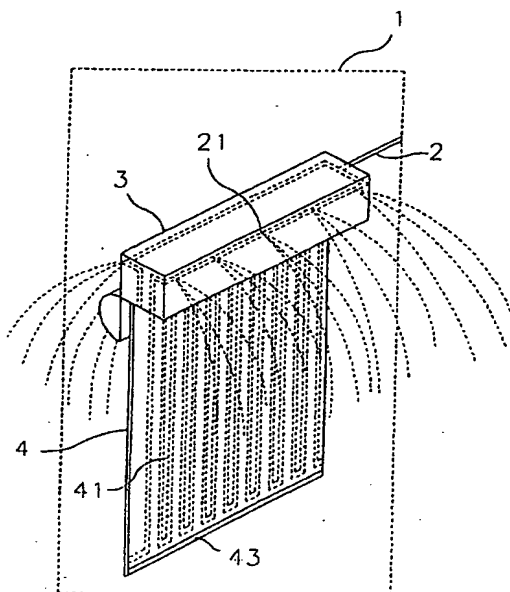


Fig. 4

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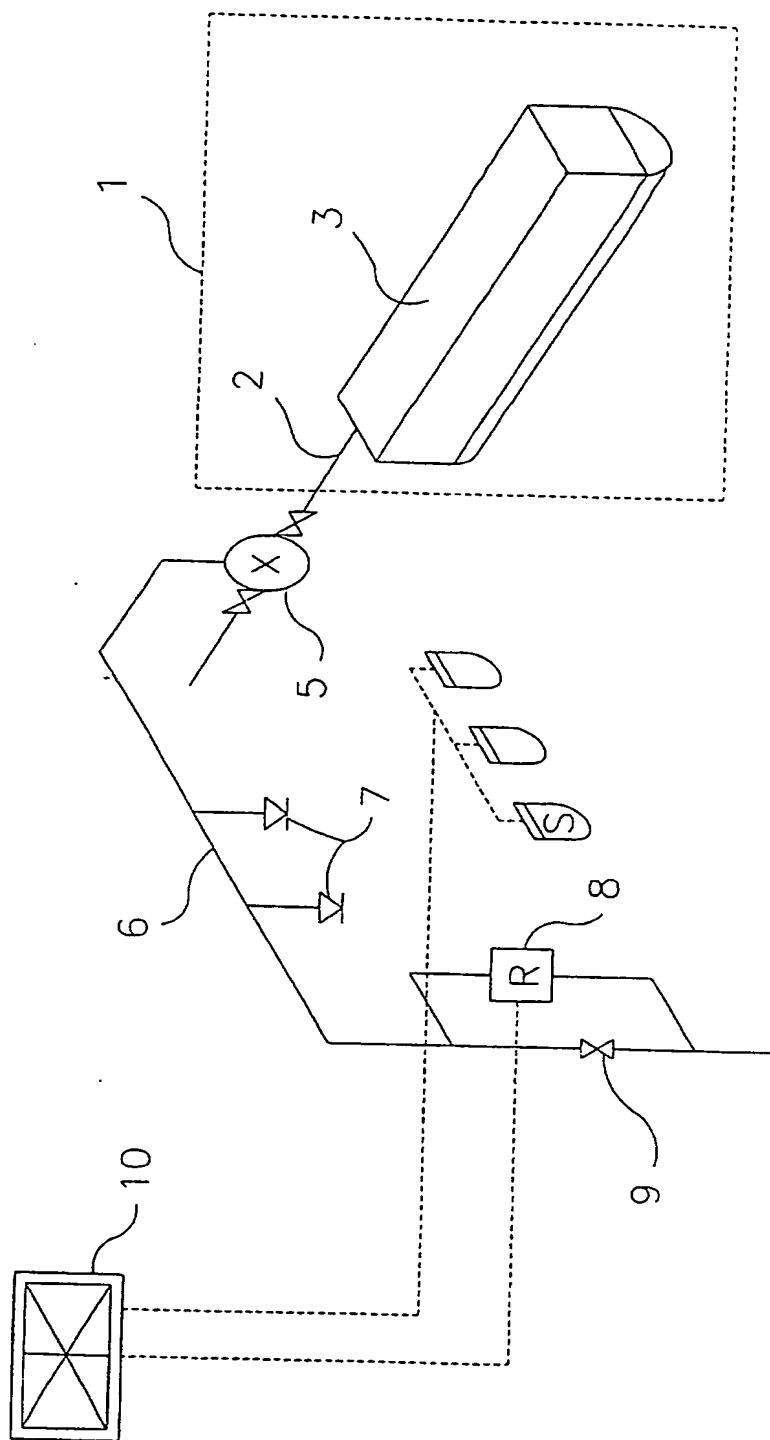


Fig. 1

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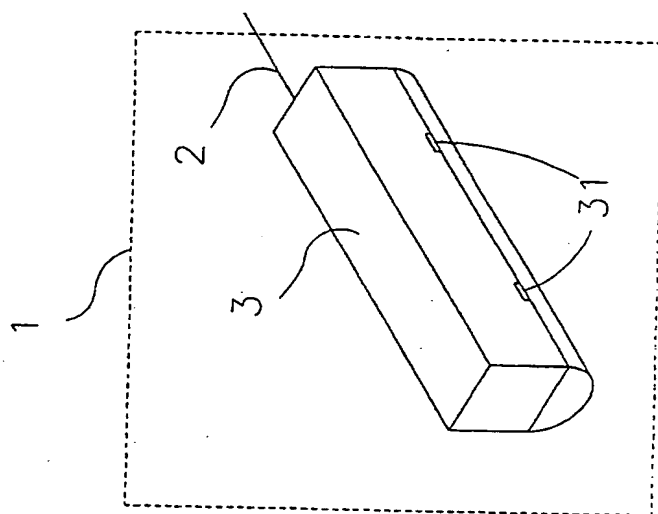


Fig. 2

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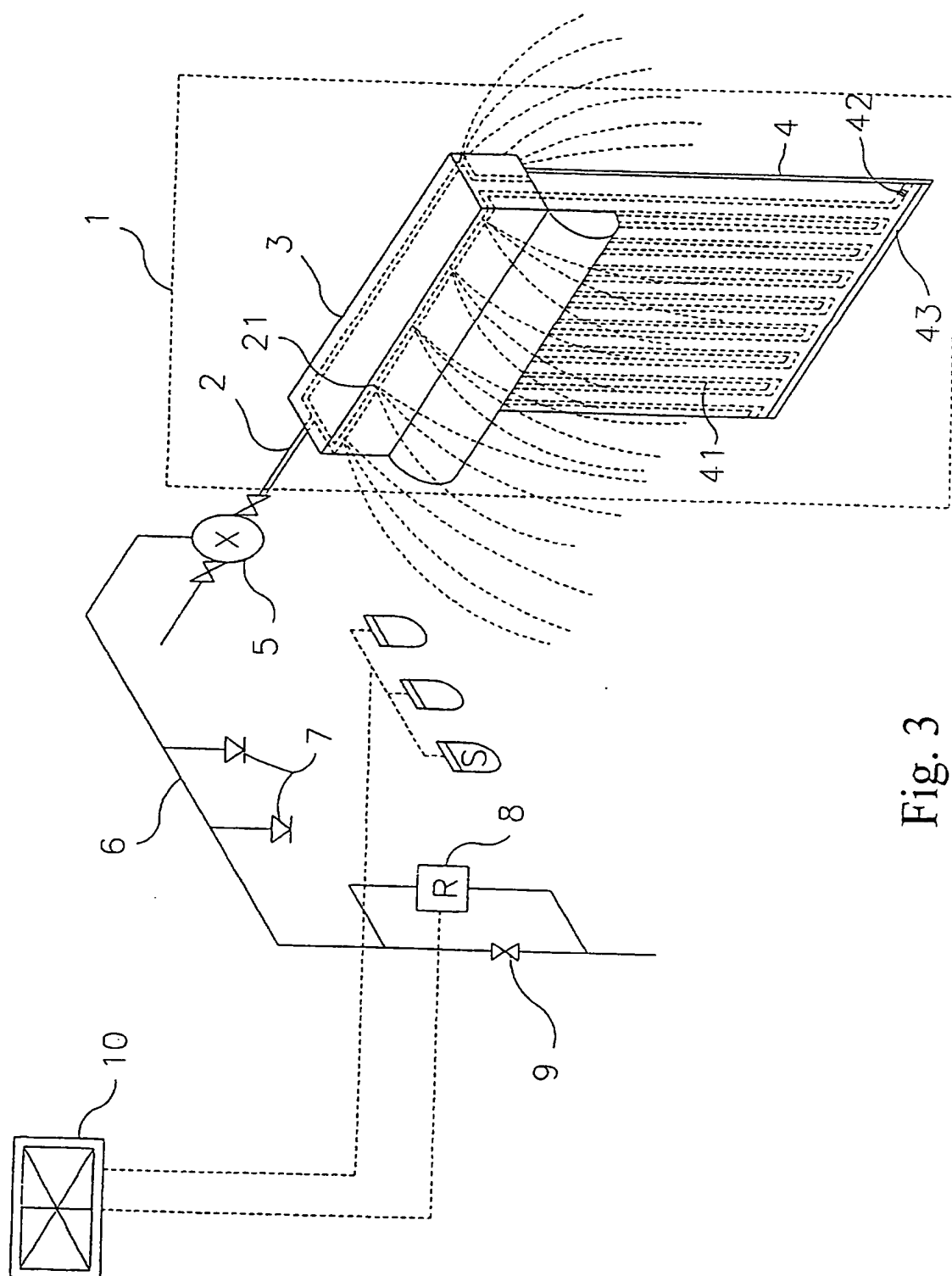


Fig. 3

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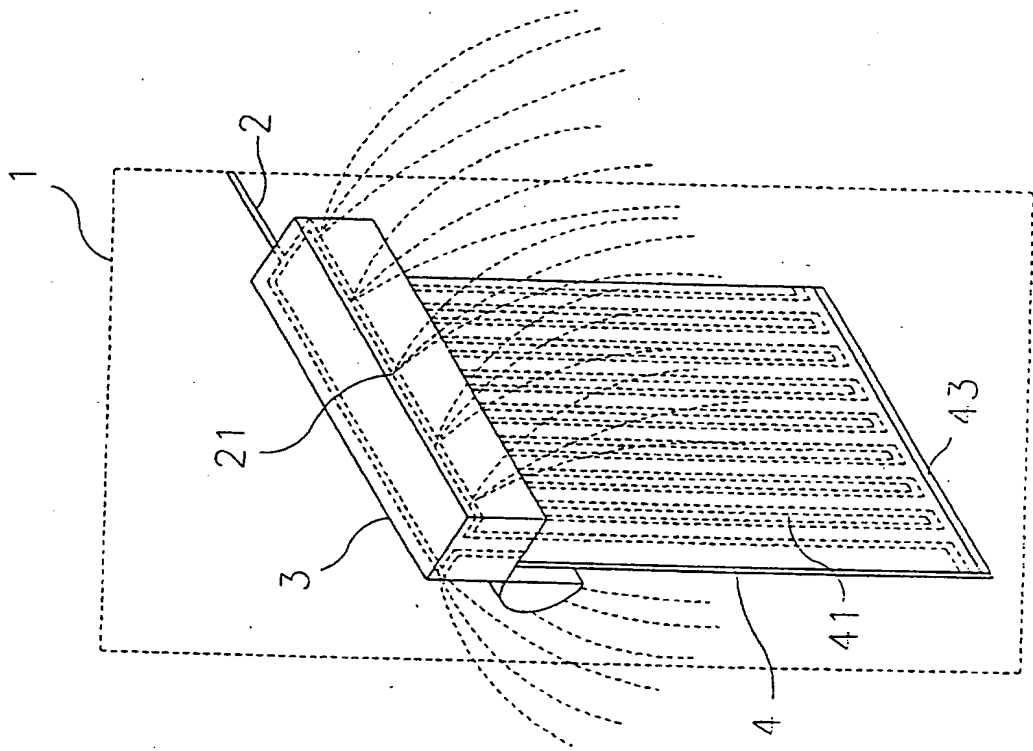


Fig. 4

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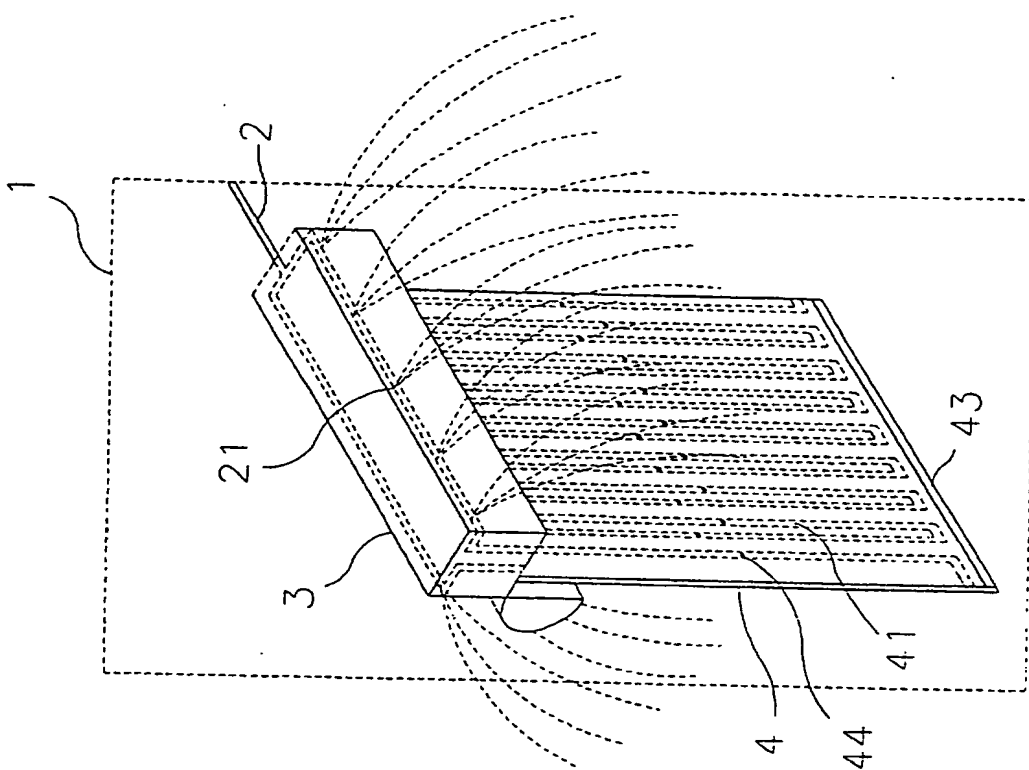


Fig. 5

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5       The present invention relates to fire and smoke control equipment, and more particularly, to fire and smoke control equipment which can isolate a fire source and smoke source and keep the fire and smoke from being widely spread.

10       In the fire control regulations of several countries, some demand to separate the fire area from the non-fire area when a fire breaks out in order to isolate the fire and smoke and to keep the fire from spreading and to avoid smoke damage. Conventionally, a gate or an electric shutter are applied to accomplish the separation. However, the gate or the electric shutter are usually incapable of sealing the fire scene because of obstacles  
15       on the ground. And even more, the gate or the electric shutter may block an escape passage, injure the escapee and even death.

      Regarding the above disadvantages, there is a need to provide safe and reliable fire and smoke control equipment which is a main object of the present invention.

20

      An object of the present invention is to provide safe and reliable fire and smoke control equipment which uses a fire curtain that can be extended to the ground from a high place such as a ceiling, the heights of an entrance, exit or passage, automatically or manually, to isolate and restrict the fire  
25       source and smoke source when a fire breaks out. The equipment of the present invention is less affected by obstacles on the ground, and more

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importantly, the escapee can lift the fire curtain to run away from the fire scene, the passage will not be obstructed, and injury or death can be prevented.

5 In an embodiment, the fire and smoke control equipment of the present invention further comprises a hose device which is supplied with water and is capable of reducing the temperature of the fire curtain to keep the fire curtain from being destroyed at a high temperature. The containment effect can be ensured. Furthermore, the fire curtain comprises a plurality of water outlets which connect to the hose device for  
10 spraying water. The fire control effect can be improved and the fire curtain will be more thoroughly protective. In the equipment, the fire curtain further comprises a water draining plug for draining water still in the hose device after the fire ceases.

15 In the other embodiment, the fire and smoke control equipment of the present invention further comprises a ground mask which ensures containment through better contact between the fire curtain and the ground.

The disclosed fire and smoke control equipment of the present invention can be applied in a public place which is required to be separated into several fire control regions, such as a shopping mall, an exhibition hall,  
20 a market, and so on. The equipment also can be applied to separate a warehouse of a factory.

The invention will be further described by way of non-limitative example with reference to the accompanying drawings, in which:-

25



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Fig. 1 depicts fire and smoke control equipment according to an embodiment of the present invention, in which the fire curtain is received in a protection case;

Fig. 2 depicts a perspective view of the fire and smoke control equipment, in which the protection case comprises a locking means;

Fig. 3 depicts the other embodiment mode of the fire and smoke control equipment according to the present invention, in which the fire curtain is extended to the ground and commences spraying water;

Fig. 4 depicts the other side of the fire and smoke control equipment shown in Fig. 3; and

Fig. 5 depicts fire and smoke control equipment according to the other embodiment of the present invention.

Fire and smoke control equipment 1 according to an embodiment of the present invention is shown in Fig. 1. The fire and smoke control equipment 1 includes a water pipe assembly 2, a protection case 3 and a fire curtain 4 (as shown in Fig. 3). Ordinarily, the fire curtain 4 is received in the protection case 3. The fire and smoke control equipment 1 is connected to a common fire control system which may, for example, include a valve 5 such as a deluge valve or a diaphragm differential pressure valve, a pressured water pipe assembly 6, a sprinkler 7, a solenoid valve 8, a manual open valve 9 and a fire control panel 10, as shown in Fig. 1. The water pipe assembly 2 of the fire and smoke control equipment 1 is connected to the fire control system which receives water from a water source and supplies water when a fire breaks out.

The protection case 3 is placed at a certain high level of a building, such as the height of an entrance or an exit, and a ceiling. The protection case 3 is for receiving the fire curtain 4, for vermin protection and avoiding

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other contamination, and for maintaining good condition. The fire curtain 4 is made of a fireproof substance such as a complex thermal-resist fiber blended material and has a top end and a bottom end. The top end is fixed to the protection case 3 and the bottom end is free to move downwards.

5 As shown in Fig. 4, when a fire breaks out, the fire curtain 4 is extended to ground automatically or manually to isolate the fire source or smoke source by opening the protection case 3. The protection case 3 will be opened by forces of pressured water in the water pipe assembly 2 or by unlocking a locking means 31 which is shown in Fig. 2. When the  
10 protection case 3 is opened, the fire curtain 4 inside will be released and extended downwards. The locking means 31 can be a device which performs a function of locking, such as a normal lock or an electromagnetic lock. The locking means 31 can be unlocked manually or automatically. In an automatic operation, the fire control panel 7 receives a fire signal  
15 when a fire breaks out and sends a start signal to the valve 5 and the locking means 31 which hereto is an electromagnetic valve. Whereby, the protection case 3 is opened and the valve 5 releases water to the fire curtain and water starts to spray.

Fig. 3 shows the other embodiment mode of the fire and smoke  
20 control equipment 1 of the present invention, in which the fire curtain 4 is extended to the ground and commences spraying water. In various embodiments, the fire curtain 4 further comprises a hose device 41. The hose device 41 connects the water pipe assembly 2 and is filled with water for reducing temperature of the fire curtain 4 and for preventing damage of  
25 the fire curtain 4 in a high temperature environment. Therefore, the containment effect of the fire and smoke control equipment 1 of the present invention will be ensured. Furthermore, the hose device 41 which is filled with water adds weight to the fire curtain 4 and consequently enhances the hanging stability of the fire curtain 4. The fire curtain 4 is kept from

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swinging caused by air which result from temperature differences in the fire scene. Therefore, the isolation effect will be further ensured.

The hose device 41 is made of one or several hoses twined and enveloped in the fire curtain 4. When pressured water from the water pipe assembly 2 comes into the hose device 41, the water helps the fire curtain 4 to rapidly extend downwards. The fire curtain 4 further comprises a water draining plug 42 near the bottom end. The water draining plug 42 allows the fire curtain 4 to release water in the hose device 41 when the fire ceases. The water pipe assembly 2 further comprises a plurality of sprinklers 21 for spraying out water to reduce temperature and to protect the fire curtain 4.

In the other embodiment, the fire curtain 4 of the present invention further comprises a ground-contact mask 43 at the bottom end of the fire curtain 4. The ground mask 43 helps the fire curtain 4 to hang smoothly and to make better contact with the ground. The containment effect will be improved. The ground mask 43 is made of complex rubber and has a height of 1.5 cm or above. Since the fire curtain 4 is flexible, it will accommodate fluctuations of the ground and therefore interference resulting from obstacles on the ground can be avoided. Fig. 4 shows the other side of the fire and smoke control equipment 1 in Fig. 3

As shown in Fig. 5, in a still further embodiment of the present invention, the fire curtain 4 further comprises a plurality of openings 44 for spraying out water. The water outlets 44 are connected to the hose device 41, capable of improving fire control effect and capable of providing the fire curtain 4 with more thorough protection.

Now take an example to describe the action of the equipment of the invention. Under normal circumstances, as shown in Fig. 1, the valve 5 stops pressured water. When a fire breaks out, the sprinkler 7 and the solenoid valve 8 turn on. The valve 5 is opened and the locking means 31 is unlocked to open the protection case 3. Meanwhile, pressured water

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enters the hose device 41 and the fire curtain 4 is forced to extend and hang to the ground, as shown in Fig. 3. The sprinklers 21 also spray out water to extinguish the fire, dispel smoke and protect the fire curtain 4. The actions will effectively confine the fire in a limited area and moreover will  
5 help to extinguish the fire and keep the fire and smoke from spreading.

When the fire is under control or ceases, the water draining plug 32 is opened on to release water in the hose device 41 and empty the hose device 41. The fire curtain 42 is then packed into the protection case 3 for the next use.

10 By the fire and smoke control equipment disclosed in the present invention, a more reliable fire scene containment is provided and the escape passage is kept from being obstructed to secure the escapee's life.

The typical embodiments of this invention have been sufficiently described in the above examples and descriptions. Though special terms  
15 are used, they are merely for general and descriptive meanings and not for a restrictive purpose. It should be understood that the scopes of the invention are intended to be protected by the following claims.

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CLAIMS

5           1.     A fire and smoke control equipment, comprising:

a protection case; and

          a fire curtain having a top end and a bottom end, the fire curtain  
received in the protection case with the top end thereof being fixed in the  
10       protection case and the bottom end thereof capable of moving downward;  
thereby when the case is placed at a certain high level of a building, the fire  
curtain can expand by moving the bottom end of the curtain downward up  
to a ground level.

15           2.     The fire and smoke control equipment of Claim 1, further  
comprising a water pipe assembly connectable to a water source for  
supplying water to the fire curtain.

20           3.     The fire and smoke control equipment of Claim 2, wherein the  
water pipe assembly further comprises a plurality of sprinklers connecting  
thereto for spraying water outward.

          4.     The fire and smoke control equipment of Claim 2 or 3, wherein the  
25       fire curtain further comprises a hose device which connects to the water pipe  
assembly.

          5.     The fire and smoke control equipment of Claim 4, wherein the  
fire curtain further comprises a plurality of water releasing openings  
30       formed thereon in connection with the hose device for spraying water  
outward.

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6. The fire and smoke control equipment of Claim 4 or 5, wherein the fire curtain further comprises a water draining plug adjacent to the bottom end.

5 7. The fire and smoke control equipment of any one of the preceding claims, wherein the fire curtain further comprises a ground mask extending from the bottom end of the fire curtain.

8. Fire and smoke control apparatus constructed and arranged to operate  
10 substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

15



**Application No:** GB 0007908.7  
**Claims searched:** All

**Examiner:** Michael R. Wendt  
**Date of search:** 28 July 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): A5A (A21)

Int Cl (Ed.7): A62C 2/08, 2/10

Other: Online: EPODOC, WPI, Japio

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2327880 A (RASONTEC) e.g. see Figure 9; Abstract; page 6 paragraph 3; paragraph bridging pages 23 - 24.	1, 2 at least
X	GB 2105987 A (HOMER) e.g. see Figure 1; page 1 lines 82 - 144.	1, 2
X	GB 1439865 (HUSSON) (& US 3877525) e.g. see Claim 1; Figure 17; page 5 lines 83 - 100.	1, 2 at least
X	EP 0572199 A1 (COLT) e.g. see Figures 2 & 3; Claim 1.	1
X	US 5809699 (SOC. D'EXPLOITATION) e.g. see Figure 1; Column 2 lines 45 etc.	1, 3, 6 at least
X	US 3960216 (ISOBE) e.g. see Figures; Abstract; Column 3 lines 54 etc.	1, 2
X	WPI Accession No: 1999-181570 & CN 1200303 A (H. TIANCAI) See Abstract.	1, 2
X	WPI Accession No: 1997-419601 & JP 090187524 A (NIPPON GLASS FIBRE) See Abstract.	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



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Application No: GB 0007908.7  
 Claims searched: All

Examiner: Michael R. Wendt  
 Date of search: 28 July 2000

Category	Identity of document and relevant passage	Relevant to claims
X	WPI Accession No: 1997-046239 & JP 080299484 A (OHBA GUMI KK) See Abstract.	1 - 3
X	PAJ & JP 060070991 A (SHIMIZU) See Abstract.	1 - 3

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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